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Advances In Multi-Channel Optical Multi-Gbytes/sec Bit-Parallel WDM Single Fiber Link

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For ultra-high-speed single media parallel interconnects, an all optical single fiber WDM format of transmitting parallel bits rather than a fiber ribbon format-where parallel bits are sent through corresponding parallel fibers in a ribbon format, can be the media of choice. Here, we shall discuss the realization of a multi-km x gbytes/sec bit-parallel WDM (BP-WDM) single fiber link. The distance-speed product of this single fiber link is more than several orders of magnitude higher than that of a fiber ribbon link. The design of a 12 bit-parallel channels WDM system operating at 1 Gbit/sec per channel rate through a single fiber will first be presented. Experimental results for a two channel system operating at that rate are given. Further improvement of distance-speed product for the BP-WDM link can be obtained with JPL's newly developed 20 Gbits/sec per channel laser diode array transmitter. Also, new computer simulation results on how a large amplitude co-propagating pulse may induce pulse compression on all the co-propagating data pulses, thereby improving the shaping of these pulses for a WDM system, will be presented and discussed. The existence of WDM solitons is also shown.